

Surgical spinal fusion is indicated for patients with curves of 50 degrees or greater. Conventional surgical techniques are equally effective. In a series of 210 male adolescents with idiopathic scoliosis, fusion became necessary in 21%.

The peak age at which boys present for the evaluation of idiopathic scoliosis is 13, about two years later than girls with scoliosis. This is appropriate because skeletal development in adolescent boys is delayed compared with girls of the same age and because scoliosis in boys can develop later and progress longer.

LORI KAROL, MD
Sacramento, California

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Physical Treatment of Soft Tissue Injuries

SOFT TISSUE INJURIES, such as strains of ligaments and muscle attachments, are often difficult to evaluate. Other than fleeting tenderness, there are few objective findings. If the injury is insufficient to cause subluxation or dislocation, physical examination, x-ray films, and even magnetic resonance imaging may not offer definitive information. Extensive physical therapy is often undertaken to reduce pain. Progress is often measured by subjective statements of pain relief. Excessive treatment, especially of injuries sustained in the workplace, has been documented. To what extent are the costs of therapy justified?

The word "injury" can be placed in quotes because it is often not clear whether the structural incompetence being treated is on the basis of progressive overload from cumulative trauma, or of a single traumatic event during an unguarded moment. Nonetheless, the rate of repair and the potential for spontaneous healing are often difficult to project when a patient is initially evaluated.

All information suggests that spontaneous healing of a non-joint-threatening soft tissue injury should be complete within five or six weeks. If not complete at that time, current evidence from sports medicine and basic studies of animals suggests that structured exercise programs are necessary to guide repair. The benefits of joint mobilization and passive treatment after six weeks or so are limited. The functional deficits created by the injury must be repaired by guided exercise programs. These principles apply to the whole array of sprains and strains that occur to all joints with cumulative or sudden overload. If the continuity of supporting ligaments and tendons has not been broken, healing is assisted by guided progressive exercises, not rest. Early passive care, such as hot packs, massage, and electrical stimulation, supports rest treatment.

If the care of soft tissue "injuries" is to be as justified as that for other medical diagnoses, the deficit must be

documented through the measure of function, and measurable amounts of therapeutic exercise must be provided to guide the healing process. An assessment of the patient-client-worker's attitude must be part of the rehabilitation process. This is often accomplished by noting the patient's compliance with a measured exercise program.

VERT MOONEY, MD
San Diego, California

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Surgical Management of Spinal Metastases

PROGRESS IN ONCOLOGY and radiation therapy, coupled with an earlier diagnosis, has led to long-term survival of patients. Patients should therefore be afforded a high degree of comfort and quality of life during their treatment. The most common malignant tumors to metastasize to the capillary beds within the large cancellous bone mass of the vertebral column include those of breast, lung, lymphatic system, prostate, kidney, gastrointestinal tract, thyroid, and others, including those that are indeterminate. Depending on the location and behavior of the spinal metastases, pain, mechanical instability, or neurologic compromise may ensue.

Metastatic cancer to bone does not itself cause either pain or neurologic compromise. Pain occurs with the loss of osseous strength. Neurologic compromise arises from ischemia due to pressure on the spinal cord or nerve roots by tumor encroachment. Surgical therapy can help manage symptomatic spinal metastatic disease.

When one or more vertebral bodies are weakened by tumor replacement, deformation (fracture) may occur. Frequently radiotherapy or chemotherapy will control tumor growth and permit bone reconstitution. Persistent pain is an indicator of instability. Restoring stability through spinal reconstruction will frequently restore comfort and the quality of life.

Even when more than one vertebra has metastases, the location of the instability can be determined by clinical assessment and radiographs. Computed tomography or magnetic resonance imaging further defines involvement. When the pedicle is the primary site of involvement and the bony trabeculae are spared, posterior stabilization, supplementing irradiation or chemotherapy, restores stability. When the vertebral body trabecular structure has been largely supplanted by tumor, anterior stabilization with allograft or other spacer is indicated. Where feasible, radiotherapy should precede surgical therapy because graft-induced osteogenesis is inhibited by postoperative irradiation. Spine implants should be designed with sufficient stability to function for the rest of the patient's life

without bony arthrodesis. Such instrumentation should be segmental, with a combination of hooks, wires, and screws used at several levels to distribute forces among normal and abnormal vertebrae. It is prudent to extend the fusion additional levels in anticipation of metastases progressing to other vertebrae. Stabilization must be imparted to those parts of the vertebrae where there is significant bone replacement, whether anterior, posterior, or both.

Metastatic tumor expansion into the spinal canal from pedicle and body may cause encroachment against the cord (cranial to L-1) or spinal nerve roots (caudal to T-10). Vertebral body collapse may cause further impingement by retropulsed bone or disc material (neither of which responds to radiation therapy). Hematogenous infection of spinal tumor may precipitate neurologic deterioration. Pain need not be associated with the development of full or lesser degrees of sensory loss or paralysis. Although paraplegia is not necessarily irreversible, surgical intervention is most effective when the preoperative neurologic deficit is minimal.

Survival after the onset of paralysis is often less than three months. If paralysis is partial or progressive, urgent surgical decompression and stabilization are often necessary. If paralysis is complete, however, particularly if the patient is free of pain, it may be prudent to accept it because the patient's life span may be less than the time required for neurologic recovery.

The metastatic lesion may be decompressed by vertebral corpectomy either posterolaterally by a transpedicular approach or anterolaterally and stabilized by anterior or posterior instrumentation. The vertebral body defect is replaced by an allograft or cement. Laminectomy alone is to be avoided.

Decision making regarding surgical therapy for intractable pain or neurologic compression should include informed deliberation by the patient and family and cooperation among the oncologist, radiotherapist, and spinal surgeon.

FRED V. ORCUTT, MD
Albuquerque, New Mexico

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Arthroscopic Shoulder Treatment—What Can and Cannot Be Done

OVER THE PAST SEVERAL YEARS, shoulder arthroscopic techniques have evolved through diagnostic capabilities to specific treatment benefits. Despite these advances, not all shoulder operations can be done arthroscopically.

Tears of the glenoid labrum are best diagnosed arthroscopically. Those not associated with instability, free

flaps, or the bucket-handled type, can be easily resected arthroscopically. These represent a small percentage of labral tears. Labral tears associated with instability of the glenohumeral joint are best diagnosed arthroscopically, but reconstruction for these tears is generally accomplished by traditional open methods.

The management of rotator cuff disease has benefited from arthroscopic techniques. Partial tears of the rotator cuff, whether above on the subacromial bursal side or below on the articular side, are best seen with arthroscopy. Acromioplasty, removal of the anterior undersurface of the acromion, routinely done in association with rotator cuff repair or as an independent procedure for the impingement syndrome, is now readily accomplished with arthroscopic techniques. When combined with an open repair of small rotator cuff tears, the size and morbidity associated with the open part of the procedure can be minimized. Medium-sized and large rotator cuff tears are best handled with traditional open techniques for both the acromioplasty and the repair. Extremely large, unrepairable rotator cuff tears, often seen in the elderly, can be partially treated with an arthroscope. Debridement and acromioplasty are of value in these cases to reduce some of the pain component, although motion and strength are often not improved.

Degenerative arthritis of the acromioclavicular joint is frequently seen in association with rotator cuff disorders. Resection of the distal clavicle, a time-honored approach for this problem, can now be accomplished arthroscopically. When indicated, it can be done in association with an arthroscopic acromioplasty. As an isolated procedure, the traditional open approach is still acceptable.

Loose bodies in the glenohumeral joint as well as stubs of the proximal biceps tendon after spontaneous rupture can be removed arthroscopically. Recalcitrant painful calcific tendinitis of the rotator cuff can be removed by arthroscopy; this is often done in association with an arthroscopic acromioplasty. Frozen shoulder or adhesive capsulitis has not been treated using arthroscopic techniques.

CARLOS PRIETTO, MD
Orange, California

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Prophylactic Antibiotics in Total Joint Arthroplasty

IN THE UNITED STATES, more than 200,000 total joint replacements are done annually. Deep infection of a prosthesis results in substantial morbidity to patients and a financial burden to the health care system—estimated at greater than \$200 million annually. The infection rate for